REMARKS/ARGUMENTS

Applicants have received and carefully reviewed the Office Action of the Examiner mailed October 22, 2004. Claims 1-13 and 15-30 remain pending. Claim 14 has been canceled without prejudice, and claims 25-30 have been added. Reconsideration and reexamination are respectfully requested.

Allowable Subject Matter

On page 3 of the Office Action, the Examiner indicated that claims 22-24 are allowed, and that claims 6, 7, 9, 10, 12-16, and 21 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 1 has been amended to include the limitations of objected to claim 14. As such, claim 1, and dependent claims 2-13 and 15-16 are all believed to be in condition for allowance.

Newly presented claim 25 includes many of the limitations of original claims 1, 2, 5 and objected to claim 6. As such, newly presented claim 25 is believed to be in condition for allowance.

Newly presented claim 26 includes many of the limitations of original claims 1, 2, 3, 8 and objected to claim 9. As such, newly presented claim 26 is believed to be in condition for allowance.

Newly presented claim 27 includes many of the limitations of original claims 1, 2, 3 and objected to claim 12. As such, newly presented claim 27 is believed to be in condition for allowance.

Newly presented claim 28 includes many of the limitations of original claim 1 and objected to claim 13. As such, newly presented claim 28 is believed to be in condition for allowance.

Newly presented claim 29 includes many of the limitations of original claim 20 and objected to claim 21. As such, newly presented claim 29 is believed to be in condition for allowance.

Rejection under 35 U.S.C. § 103

The remaining claims, namely claims 17-21 and 30, will now be discussed. Claims 17-20 were rejected as being unpatentable over Shute et al. (US 4,655,705). The Examiner states that Shute et al. teaches the concept of monitoring the intensity of a burner flame in order to determine if a flue is blocked, but does not teach such concept in an HVAC system. The Examiner asserts that it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the flame monitoring/flue blockage detection method of Shute et al. within an HVAC system because the basic relationship between the flame and flue is the same as in Shute et al.

Claim 17, as amended, recites:

> 17. (currently amended) A controller for used with an HVAC system, the HVAC system having a burner and a flue wherein the flue serves as an exhaust for the burner, the HVAC system further having a flame sensor for monitoring the flame of the burner, the controller comprising:
>
> monitoring means adapted to receive and monitor an output signal from the flame sensor, wherein the output signal can indicate, among other things, the presence or absence of a flame; and
>
> determining means for determining if the output signal of the flame sensor indicates that the flue is at least partially blocked.

As can be seen, claim 17 recites a controller that includes monitoring means that is adapted to receive and monitor an output signal from a flame sensor, wherein the output signal can indicate, among other things, the presence or absence of a flame. Claim 17 further recites determining means for determining if the output signal of the flame sensor indicates that the flue is at least partially blocked.

In contrast, Shute et al. teach a wood burning stove in which a flue block switch senses an increase in the flame temperature within the blast tube due to a flue blockage or an open door condition (Shute et al., column 3, lines 29-38). The flue block switch has a pre-established temperature threshold (for example 465° F) at which a bi-metallic assembly changes state in response to the temperature change resulting from either the opening of the stove door or the blockage of the flue. (Shute et al., column 3, lines 38-45). As can be seen, the flue block switch would be in one state (dictated by the bi-metallic assembly) when there is: (1) no flame; and (2) flame but no flue blockage or an open door condition. The flue block switch only changes to the second state (dictated by the bi-metallic assembly) when there is flame and when there is a flue

blockage or an open door condition. Thus, the flue block switch of Shute et al. cannot produce an output signal that can indicate, among other things, the presence or absence of a flame, as recited in claim 17.

Rather than using the flue block switch, it appears Shute et al. suggest providing a second sensor for detecting the presence of a flame. Shute et al. state that ignitor 80 also functions as a thermocouple to verify that the burner is properly operating by sensing the heat in the formed combustion chamber of the blast tube in the vicinity of target 64. Shute et al. state a silicon carbide element is employed to function as both a heat generating element (e.g. ignitor) and a combustion detecting element. (Shute et al., column 5, lines 33-40). As such, Shute et al. suggest using a first sensor (ignitor 80) to monitor combustion in the burner, and a second sensor (flue block switch) to detect a flue blockage or an open door condition. In claim 17, the same sensor is used to indicate the presence or absence of a flame AND to determine if the flue might be blocked. As noted in the present specification:

> To help detect such flue blockages, pressure sensors, flow sensors, temperature sensors, and the like, are often provided in the flue to detect insufficient flow of exhaust gases through the flue. However, it has been found that these additional sensor elements, wiring, and connections can unduly increase the cost and possibly reduce the reliability of the HVAC system.
> ...
> The present invention is directed at systems and methods for detecting flue blockages without the addition of numerous additional sensor elements, wiring, and connections that can unduly increase the cost and possibly reduce the reliability of the HVAC system. In virtually all combustion systems, including HVAC heating systems, a flame sensor is already provided to detect if flame is present before the main fuel is turned on, and/or if the flame is lost after initial ignition and while the main fuel is turned on. If either of these conditions occurs, the HVAC system is typically shut down. In one illustrative embodiment of the present invention, the flame sensor is also used to detect a flue blockage.

(Specification, page 1, lines 18 through page 2, line 10). As can be seen, the invention recited in claim 17 has clear advantages over the system disclosed by Shute et al. In view of the foregoing, claim 17 is believed to be clearly patentable over Shute et al. For similar and other reasons, dependent claim 18 is also believed to be clearly patentable over Shute et al.

Now turning to claim 19, which recites:

19. (original) An HVAC system comprising:

an oil burner disposed within a chamber having a flue;
a flame sensor disposed to optically monitor a flame produced by the oil burner; and
a controller adapted to receive and monitor an output signal of the flame sensor, and for determining if the output signal of the flame sensor indicates that the flue is at least partially blocked.

As discussed above, Shute et al. suggest using a bi-metallic flue block switch to detect flue blockages. The bi-metallic flue block switch switches state when the temperature rises above a pre-established temperature threshold (for example 465° F), which provides an indication of a flue blockage or the opening of the stove door. Shute et al. clearly does not teach or suggest optically monitoring the flame, as recited in claim 19. For these and other reasons, claim 19 is believed to be clearly patentable over Shute et al.

Turning now to claim 20, which recites:

20. (currently amended) A controller-readable medium having program stored thereon, such that when executed by a controller of an HVAC system having a burner that produces a flame, a flue for providing an exhaust for the burner, and a flame sensor for monitoring the flame of the burner, the controller is capable of performing the following steps:
receiving a flame value related to the flame sensor output;
during an ignition sequence, using the flame value to determine if a flame is present, and if a flame is present, allowing the HVAC system to continue;
comparing the flame value to an acceptable flame value range; and
if the flame value is outside of the acceptable flame value range, indicating that the flue may be at least partially blocked.

As can be seen, claim 20 recites the step of receiving a flame value that is related to the flame sensor output. Claim 20 also recites the step of during an ignition sequence, using the flame value to determine if a flame is present, and if a flame is present, allowing the HVAC system to continue. Claim 20 also recites the step of comparing the flame value to an acceptable flame value range, and if the flame value is outside of the acceptable flame value range, indicating that the flue may be at least partially blocked. Thus, for similar reasons to those discussed above with respect to claim 17, claim 20 is also believed to be clearly patentable over Shute et al. For similar and other reasons, dependent claim 21 and newly presented claim 30 are also believed to be clearly patentable over Shute et al.

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Reconsideration and reexamination are respectfully requested. It is submitted that, in light of the above remarks, all pending claims 1-13, and 15-30 are all in condition for allowance. If a telephone interview would be of assistance, please contact the undersigned attorney at 612-677-9050.

Respectfully submitted,

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